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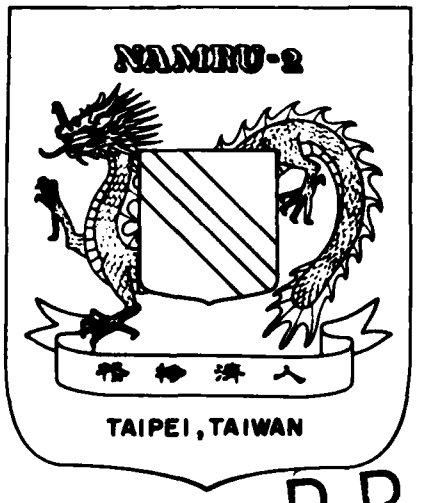
REPORT NO. TR-714



UNITED STATES NAVAL
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VETERINARY MEDICINE DEPARTMENT

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This study was supported in part through funds provided by the Naval Medical Research and Development Command, Navy Department, for Work Unit FM 51.524.009-0024B.

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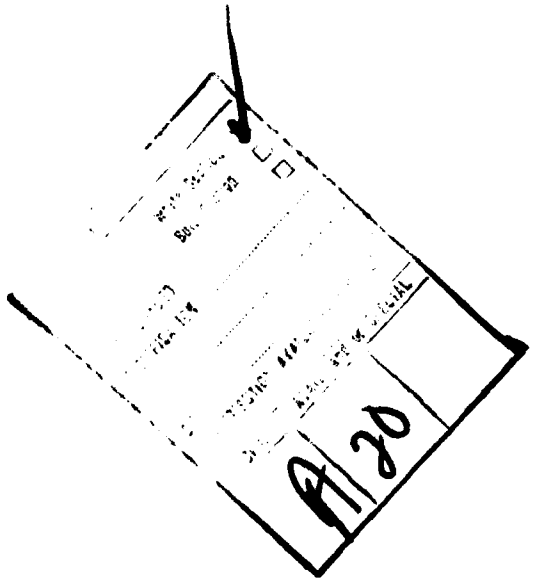

Int. J. Zoon., 3: 61-64, 1976

INFLUENZA VIRUS ISOLATIONS FROM DOGS DURING A HUMAN EPIDEMIC IN TAIWAN

C. P. CHANG, DVM; A. E. NEW, DVM, MS;
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The susceptibility of dogs and cats to human influenza virus has been demonstrated experimentally,[1,2,6,7,11] and since these animals often intimately share man's environment, they may play an important role as reservoir hosts, or actually participate in transmission of human influenza. The purpose of this study was to attempt isolation of influenza virus from dogs and cats during a human epidemic of influenza A/Hong Kong/68 (H3N2) which occurred in June and July 1971 in Taiwan.[3,8]

MATERIALS AND METHODS

Collection of specimens: From mid-June to mid-July 1971, throat swabs were taken from 372 dogs and 28 cats at veterinary hospitals in the cities of Taipei, Taichung, Kaohsiung and Pingtung, Taiwan, Republic of China. Swabs were placed into 3 ml brain-heart infusion broth containing 100 IU of penicillin, 100 μg streptomycin, and 50 units of mycostatin per ml. Specimens were stored at -20 C in hospitals, then returned on dry ice to the NAMRU-2 laboratory in Taipei within one week. Dogs in Taipei city found to have influenza virus were resampled by throat swabs and sera 1 month later (in early August 1971).

Virus isolations and identifications: Nasal swab specimens were inoculated into primary monkey kidney tissue culture tubes, incubated, and observed for viral growth by cytopathic effects and by the haemadsorption procedures.[9] The identity of viral isolates was determined by the HI test, using influenza and parainfluenza antisera. Re-isolation attempts were made in tissue cultures and chicken embryonated eggs. Several isolates were forwarded to the WHO International Influenza Center for the Americas, Center for Disease Control, Atlanta, Georgia for further examination and confirmation.

Serology: Only 7 dogs from Taipei city were available for follow-up 1 month later and their sera were tested for influenza (A/Hong Kong/68, A/Taiwan/72 and B/Taiwan/68) by haemagglutination inhibition (HI).[9] The sera were absorbed with rooster erythrocytes, inactivated at 56 C for 30 minutes prior to treatment with kaolin to remove nonspecific inhibitors.

This study was supported in part through funds provided by Bureau of Medicine and Surgery, Navy Department, for Work Unit FM51.524.009-0024B. The opinions and assertions contained herein are those of the authors and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

Reprint requests to Publications Office, U. S. Naval Medical Research Unit No. 2, 7-1 Kung Yuan Lu, Taipei, Taiwan (or to NAMRU-2, Box 14, APO San Francisco 96263).

RESULTS

In early July 1971, viruses were isolated from 7 dogs in Taipei city and from 1 in Taichung city (Table 1). No virus was isolated on follow-up of the 7 positive animals and only one animal was found to have an HI titer of 1:10 against A/Hong Kong/68 when sampled 1 month later (in early August 1971). No virus was isolated from cats, but the sample was small.

Table 1. Dogs and Cats Sampled for Influenza Virus in June and July 1971

Species	Locality			Total
	Northern Taiwan	Central Taiwan	Southern Taiwan	
Dog	262*(7)	73 (1)	37	372 (8)
Cat	22	4	2	28
Total	284 (7)	77 (1)	39	400 (8)

* No. tested
( ) No. positive

A virus isolated from a 2-month-old Dachshund in Taipei city was identified as influenza B virus resembling the B/Victoria/98926/70 reference strain. Two viruses, one from Taipei city and the other from Taichung city, were identified as influenza A identical with Hong Kong/68 virus. The other 5 Taipei city isolates showed cytopathic effects in primary monkey kidney (PMK) tissue culture and were haemadsorption-positive. These isolates could not be identified further however, because of low titers or failure to grow after passages in PMK tissue cultures and embryonated chicken eggs.

DISCUSSION

The susceptibility of dogs to human influenza viruses: A1 (H1N1), Asian (H2N2), Hong Kong (H3N2) and type B virus has been demonstrated,[1,6,7,11] and canine serum antibodies against these viruses have also been reported.[4,8,11] Isolation of an influenza virus closely related to the human A/Hong Kong/68 strain was recently reported from a dog in Russia.[9] In the present study, an influenza virus closely related to the human A/Hong Kong/68 strain was isolated twice during a human influenza epidemic (June-July 1971). An influenza B virus was also isolated and confirmed as indistinguishable from the B/Victoria/98926/70 reference strain by re-isolation from the original lyophilized specimen at the WHO International Influenza Center, Atlanta, Georgia. To our knowledge it is the first influenza B virus isolate of canine origin which is closely related to human strains.

Following the primary virus isolation in dogs, neither the influenza A or B virus could be reisolated from the same dog nor could significant levels of HI antibody be demonstrated 1 month later. This might reflect insufficient replication of

virus to provide adequate antigenic stimulation in dogs, or the dogs might have been contaminated with influenza virus shed by affected humans in the same household.

In contrast to the worldwide spread of viruses A, virus B is rarely reported and it is usually associated with sporadic cases.[11] In late June and August 1971 in Hsinchu county, Taiwan, an influenza B virus was also isolated from the throat of a patient who had symptoms of a "common cold".[12] Furthermore, the present results are in accordance with a report by Sereda of synchronous circulation in swine of human influenza viruses—Asian virus, Hong Kong virus and B virus in the Ukraine, U.S.S.R.,[10] and may indicate that either type A or B influenza virus is capable of crossing species barriers in animals in nature.

SUMMARY

During an islandwide outbreak of human influenza in June and July 1971, throat swabs were taken from dogs and cats in 3 urban communities of Taiwan. Eight influenza isolates were obtained from dogs in July 1971: two were identified as influenza A closely related to the human Hong Kong/68 virus, and one was a strain of influenza type B closely resembling human influenza B virus. The latter is the first such reported isolation from dogs under natural conditions.

ACKNOWLEDGEMENT

The authors are grateful to Dr. W.R. Dowdle, WHO International Influenza Center for the Americas, CDC, Atlanta, Georgia, for examining the virus isolates; Major A.R. Banknieder USAF VC, Head, Veterinary Medicine Department, NAMRU-2, and Major W.C. Cole VC USA, Assistant Head, Veterinary Medicine Department, NAMRU-2 for their advice and for reviewing the manuscript. The authors also thank Mr. S.C. Hung and Miss L.H. Lee, Microbiology Department, NAMRU-2, for their excellent technical assistance.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER NAMRU-2-TR-714	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Influenza Virus Isolations from Dogs During a Human Epidemic in Taiwan		5. TYPE OF REPORT & PERIOD COVERED Technical Report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) C. P. Chang, A. E. New, J. F. Taylor and H. S. Chiang		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Naval Medical Research Unit No. Box 14, APO San Francisco 96263		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 2, FM51.524.009-0024B.
11. CONTROLLING OFFICE NAME AND ADDRESS Commanding Officer, Naval Medical Research and Development Command, National Naval Medical Center, Bethesda, MD 20014		12. REPORT DATE 1976
		13. NUMBER OF PAGES 4
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

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18. SUPPLEMENTARY NOTES

Published in the Int. J. Zoon. 3: 61-64, 1976

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Influenza virus A
Influenza virus B
Human influenza
Canine

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

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